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INST FRANCAIS DU PETROLE

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2- and 3-Phenyl alkane(s) prepn. - by reacting benzene with linear olefin using catalyst of de-aluminised mordenite, for biodegradable detergent

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Prepn. of a mixt. of 2-phenylalkanes and 3-phenylalkane comprises reacting, in a reaction zone, benzene with a charge contg. at least one 9-16C linear olefin using a catalyst based on dealuminated mordenite (I).

The obtd. prod. is then fractionated to obtain separately.

a first fraction contg. unreacted benzene;
a second fraction contg. unreacted 9-16C olefin;
a third fraction contg. a mixt. of the 2- and 3-phenylalkanes; and
a fourth fraction contg. at least one poly-alkylbenzene.

The fourth fraction is at least partly recycled to the reaction zone where it reacts with benzene in presence of (I) to be at least partly transalkylated, and a mixt. of 2- and 3-phenylalkanes is recovered.

(I) has

overall Si/Al atomic ratio of 15-85 (pref. 15-60),
Na wt. content of <1000 (pref. <250) ppm
a very low or zero content of extra-network Al species;
an elementary mesh vol. <2.760 (pref. <2.745) nm³,
asymmetrical vibration frequency of the tetrahedra TO₄ (T = Al or Si) >1070 (pref. >1082) cm⁻¹
in the IR spectrum; and
micropore vol. > 0.150 (pref. > 0.190) cm³ (liquid)/g.
The first and second fractions are pref. also at least partially recycled. Reaction is pref. at < 60°C.

USE

The 2- and 3-phenyl alkane mixt. is used as base for prodn. of biodegradable detergents (by sulphonation).

ADVANTAGE

Catalytic performance is superior to prior art catalysts; (I) is highly active, highly selective and esp. resistant to deactivation.

PREFERRED CATALYST

(I) is such that the intensity of signals corresp. to the outside frame (extra network) alumina species EP-466558-A+

to the intensity of signals corresp. to the frame alumina species (measured by ²⁷Al, NMR and IR spectroscopy in the OH gps. region) is <0.15 (pref. <0.05).

(I) has a secondary pore network of above 0.020 cm³/g.

The catalyst pref. also contains a matrix selected from clays, alumina, silica, magnesia, zirconia, TiO₂ and/or boron oxide.

EXAMPLE

100g of a large pore mordenite in Na form (TSZ 600 NAA from Tosoh Co.) of formula Na₂AlO₂(SiO₂)_{5.1} was heated at reflux at 100°C for 2 hrs. in an ammonium nitrate soln. (4M), the vol. of which was four times the wt. of mordenite.

This cation exchange operation was repeated three times. The prod. (contg. 500 ppm Na) was treated with an aq. soln. of HNO₃ of normality 4.5N at reflux. The obtd. catalyst had the following characteristics. Na content:- 25 ppm; Si/Al (overall):- 40; elementary mesh vol.:-2.715 nm³; IR frequency TO₄:- 1086 cm⁻¹; micropore vol.:- 0.272 cm³/g and mesopore vol.:- 0.178 cm³/g (Dubinin).

The catalyst was used for the alkylation of benzene with dodecane-1 under the following conditions:- temp. 56°C; pressure 4MPa, LHSV 3, benzene/dodecane-1 molar ratio: 5.5.

Selectivities to 2-phenyl-dodecane and 3-phenyldodecane w.r.t. converted dodecene-1 were 75.8% and 10.6% resp. (14pp950DAHDwgNo0/1).

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